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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/554,298	11/18/2005	Klaus Rutz	29805.132.3	4353

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
3746	

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10/06/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/554,298	RUTZ ET AL.	
	Examiner	Art Unit	
	Philip Stimpert	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 July 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7,12,13 and 15-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7,12,13 and 15-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 15-20 rejected are under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Regarding claim 15, the claim positively recites "a compression stroke" in lines 3 and 6.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 7, 12, 13 and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haberlander et al. (US 6,457,944) in view of Moddemann (US 2002/0067148), Llewellyn (GB 2,130,305) and Takahashi et al. (US 5,664,937).

6. Regarding claim 13, Haberlander et al. teach a method for controlling a pump (1, see col. 5, ln. 65-67) including a pump element which may be a diaphragm (col. 2 ln. 27) that is actuated by a ram (2, see col. 5, ln. 50-55) which is powered by an electric motor (3), comprising reciprocating the pumping element by rotation of the cam. Haberlander teaches that the reciprocation takes place in a first direction for a

compression, or pressure, stroke and in a second direction for an aspiration, or suction, stroke. Haberlander et al. also teach providing input of a required quantity, in the form of a pump stroke and a total dosing volume, to a positional controller (8, col. 6, ln. 63 through col. 7 ln. 2, and col. 7, ln. 39-41) that is coupled to a motor controller (4). Haberlander et al. further teach providing input of a current position of the rotating cam (from sensors 11) to the controller (8), calculating a currently required rotating speed based on the position and required quantity (col. 7, ln. 17-41), and transmitting that required speed to the motor controller (4). Haberlander et al. do not specifically teach that the motor is an electronically commutated (EC) motor. However, they do teach that at least frequency and thus rotational rate control is necessary for their method, and realized by their pump. Moddemann teaches an EC motor (2), and teaches that it has position and speed control capabilities (paragraph 15). It is thus apparent to those of ordinary skill in the art that the EC motor of Moddemann could be substituted for the asynchronous motor of Haberlander et al. by known methods of motor installation and control circuit linkage, to achieve the predictable result of an operational metering pump as in the system of Haberlander. Where a claimed improvement on a device or apparatus is no more than "the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for improvement," the claim is unpatentable under 35 U.S.C. 103(a). Ex Parte Smith, 83 USPQ.2d 1509, 1518-19 (BPAI, 2007) (citing KSR v. Teleflex, 127 S.Ct. 1727, 1740, 82 USPQ2d 1385, 1396 (2007)). Accordingly Applicant claims a combination that only unites old elements with no change in the respective functions of those old elements,

and the combination of those elements yields predictable results; absent evidence that the modifications necessary to effect the combination of elements is uniquely challenging or difficult for one of ordinary skill in the art, the claim is unpatentable as obvious under 35 U.S.C. 103(a). Ex Parte Smith, 83 USPQ.2d at 1518-19 (BPAI, 2007) (citing KSR, 127 S.Ct. at 1740, 82 USPQ2d at 1396. Accordingly, since the applicant[s] have submitted no persuasive evidence that the combination of the above elements is uniquely challenging or difficult for one of ordinary skill in the art, the claim is unpatentable as obvious under 35 U.S.C. 103(a) because it is no more than the predictable use of prior art elements according to their established functions resulting in the simple substitution of one known element for another. Thus provided, the EC motor of Moddemann would produce rotation of the rotor via a rotating magnetic field as claimed, under the control of the motor controller (9, 10). Haberlander et al. do not teach varying the rotating speed of the cam during a compression stroke of the pump. Llewellyn teaches a cam-driven piston pump, and in particular teaches that the cam is driven to drive the pistons at constant speed (page 1, ln. 119) so as to produce a uniform flow rate (page 1, ln. 29-34). Llewellyn teaches accomplishing this by varying a profile of the cam while maintaining rotational speed thereof. However, those of ordinary skill in the art are aware of the mathematical disciplines of kinematics and calculus, and would thus be completely capable of deriving formulae for producing constant piston linear velocities given any cam profile. Further, Takahashi et al. teach a precision pump which includes altering the rotating speed of a motor to affect pump output pressure evenness (col. 2, ln. 26-32). Therefore, it would have been obvious to

one of ordinary skill in the art at the time of the invention to modify the pump control system of Haberlander et al. to vary the speed of rotation of the cam as taught by Takahashi et al. to produce constant velocity of the pumping element, as taught by Llewellyn. Thus modified, one of ordinary skill would appreciate that the rotational speed of the cam would decrease to a minimum halfway through the compression stroke, as the component of the cam's movement in the direction of the stroke would be maximum at that point in the stroke and the rotation speed would decrease to it's minimum to maintain the constant linear motion of the diaphragm. Further, Haberlander teaches that it is “possible to significantly shorten the suction cycle relative to the pressure cycle” and that this results in a reduced gap in dosing. Thus it would be obvious to accelerate the rotating speed of the cam from a minimum to a maximum speed starting approximately halfway through the compression stroke so as to maintain the constant linear speed of the diaphragm, and to maintain the maximum rotating speed through the aspiration stroke to minimize the time duration of that stroke.

7. Regarding claims 7 and 12, Moddemann teaches capturing the position of the motor via an integral rotor position sensor (11). Those of ordinary skill would appreciate that such a position would be directly analogous to the position of the cam of Haberlander et al., since the cam would be directly coupled to the rotor. Further, as Haberlander et al. teach providing position data to the positional controller (8), this implies at least an operational coupling of the positional controller and any position sensor.

8. Haberlander et al. teach a method for controlling a pump (1, see col. 5, ln. 65-67) including a pump element which may be a diaphragm (col. 2 ln. 27) that is actuated by a ram (2, see col. 5, ln. 50-55) which is powered by an electric motor (3), comprising reciprocating the pumping element by rotation of the cam. Haberlander teaches that the reciprocation takes place in a first direction for a compression, or pressure, stroke and section for an aspiration, or suction, stroke. Haberlander et al. teach that the electric motor (3) is asynchronous, and that the operating speed thereof may be varied (such as during the suction cycle). Haberlander et al. do not teach varying the rotating speed of the cam during a compression stroke of the pump. Llewellyn teaches a cam-driven piston pump, and in particular teaches that the cam is driven to drive the pistons at constant speed (page 1, ln. 119) so as to produce a uniform flow rate (page 1, ln. 29-34). Llewellyn teaches accomplishing this by varying a profile of the cam while maintaining rotational speed thereof. However, those of ordinary skill in the art are aware of the mathematical disciplines of kinematics and calculus, and would thus be completely capable of deriving formulae for producing constant piston linear velocities given any cam profile. Further, Takahashi et al. teach a precision pump which includes altering the rotating speed of a motor to affect pump output pressure evenness (col. 2, ln. 26-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the pump control system of Haberlander et al. to vary the speed of rotation of the cam as taught by Takahashi et al. to produce constant velocity of the pumping element, as taught by Llewellyn. Thus modified, one of ordinary skill would appreciate that the rotational speed of the cam would decrease to a minimum

halfway through the compression stroke, as the component of the cam's movement in the direction of the stroke would be maximum at that point in the stroke and the rotation speed would decrease to it's minimum to maintain the constant linear motion of the diaphragm. Further, Haberlander teaches that it is “possible to significantly shorten the suction cycle relative to the pressure cycle” and that this results in a reduced gap in dosing. Thus it would be obvious to accelerate the rotating speed of the cam from a minimum to a maximum speed starting approximately halfway through the compression stroke so as to maintain the constant linear speed of the diaphragm, and to maintain the maximum rotating speed through the aspiration stroke to minimize the time duration of that stroke. Further, Haberlander et al. do not specifically teach that the motor is an electronically commutated (EC) motor. However, they do teach that at least frequency and thus rotational rate control is necessary for their method, and realized by their pump. Moddemann teaches an EC motor (2), and teaches that it has position and speed control capabilities (paragraph 15). It is thus apparent to those of ordinary skill in the art that the EC motor of Moddemann could be substituted for the asynchronous motor of Haberlander et al. by known methods of motor installation and control circuit linkage, to achieve the predictable result of an operational metering pump as in the system of Haberlander, as above with respect to claim 13.

9. Regarding claim 16, Haberlander et al. teach that the rotational speed of the motor is varied based on a sensed rotor position or a sensed cam position (col. 6, ln. 25-34). One of ordinary skill would appreciate that sensing the one is equivalent to sensing the other, given that they are utilized to determine fore and back dead center

positions, and that thus both are sensed and utilized in the control algorithm. Further, since the motor of the combination is an electrically commuted motor, the operation is independent of the load on the motor.

1. Regarding claim 17, according to the combination, the cam is kept at a maximum rotating speed during the aspiration stroke and would thus tend to begin the compression stroke (which the examiner notes begins at the end of the aspiration stroke) at that maximum speed. Further, the component of the cam's movement in the direction of the diaphragm stroke would be minimum at the beginning and end of the compression stroke, thus in order to maintain a constant linear motion, the rotational speed would necessarily be maximum at the start of the compression stroke. As geometrically required to maintain constant linear ram speed during compression, the rotation of the motor would necessarily slow around halfway through the compression stroke and re-accelerate toward the end. This is a function of the component in the direction of reciprocation of the point of contact between the cam and the ram.

2. Regarding claim 18, the combination of references teaches increasing the speed of rotation of the cam toward the end in order to compensate for the decreasing reciprocating component of the cam's motion at that point in the cycle, in order to approach the constant ram speed as closely as possible.

3. Regarding claim 19, Haberlander teaches operating the motor at a substantially constant (maximum) speed during the aspiration stroke (col. 7, ln. 45-48). With a constant profile cam, this will lead to a variation in the linear speed of the ram.

10. Regarding claim 20, Haberlander teaches that by maximizing the speed during the aspiration stroke, the aspiration stroke is made much shorter than the compression stroke (col. 8, ln 49-54). Since the ram travels the same distance in both strokes, its average speed will be lower during the compression stroke than the aspiration stroke.

Response to Arguments

11. Applicant's arguments filed 13 August 2010 have been fully considered but they are not persuasive.

12. With respect to the rejections under 35 U.S.C. 112, the rejections which have been addressed have been withdrawn. However, the rejection of claim 15 is maintained, as set forth above.

13. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In whole, the references teach the desirability of a constant linear ram speed, and as noted above, those of ordinary skill in the art are capable of translating that goal into commands for a rate and position controlled motor such as that of Moddemann.

14. With respect to the argument that one of ordinary skill would not use an EC motor in the system of Haberlander et al., the examiner points out that this also attacks the references individually. As noted above, it is considered obvious to use another motor which can be controlled to the same degree in the system of Haberlander et al. in order to obtain the same result. As such, it is immaterial that Haberlander et al. use an

asynchronous motor, in the absence of concrete evidence that use of an EC motor would have been particularly difficult to incorporate into that system.

15. With respect to the argument that the piston of Llewelyn is distinct from the diaphragm and ram of Haberlander et al. and the instant application, the examiner disagrees. Both types of systems are positive displacement pumps in which working chamber volume is directly related to the stroke of a pumping member, whether or not that pumping member is a diaphragm, ram, or piston, or whether or not that element contacts the working fluid.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571)270-1890. The examiner can normally be reached on Mon-Fri 7:30AM-4:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art Unit 3746

/P. S./
Examiner, Art Unit 3746
30 September 2010